What is claimed is:

1. A method for manufacturing a complementary metal oxide semiconductor (CMOS) image sensor having microlenses therein, the method comprising the steps of:

a) preparing a semiconductor substrate including isolation regions and photodiodes therein obtained by a predetermined process;

b) forming an interlayer dielectric (ILD), metal interconnections and a passivation layer formed on the semiconductor substrate in sequence;

c) forming a color filter array having a plurality of color filters on the passivation layer;

d) forming an over-coating layer (OCL) on the color filter array by using a positive photoresist;

e) forming openings in the OCL by patterning the OCL by using a binary mask, wherein the binary mask has coated portions and uncoated portions, the uncoated portions being disposed above boundaries between the color filters; and

f) forming dome-typed microlenses on a patterned OCL.

2. The method as recited in claim 1, wherein the step f) includes the steps of:

f1) forming a microlens layer on the patterned OCL;

f2) forming rectangular microlenses by patterning the microlens layer into a predetermined configuration; and

f3) carrying out a flow process.

3. The method as recited in claim 2, wherein the microlens layer uses a silicon oxide-based photoresist material.

4. The method as recited in claim 1, wherein the uncoated portion of the binary mask has the width less than a maximum resolution in order to form the opening with the width in the range of about 0.1 μm to about 0.2 μm.

5. The method as recited in claim 1, wherein the width and the height of the opening is adjusted by controlling a dose amount.

6. The method as recited in claim 1, wherein the coated portions of the binary mask are coated with chromium (Cr).

7. The method as recited in claim 1, after the step d), further comprising the step of carrying out a curing process for hardening the OCL.

8. A method for manufacturing a CMOS image sensor having microlenses therein, the method comprising the steps of:

a) preparing a semiconductor substrate including isolation regions and photodiodes therein obtained by a predetermined process;

b) forming an ILD, metal interconnections and a

passivation layer formed on the semiconductor substrate in sequence;

c) forming a color filter array having a plurality of color filters on the passivation layer;

d) forming an OCL on the color filter array by using a negative photoresist;

e) forming openings in the OCL by patterning the OCL by using a binary mask, wherein the binary mask has coated portions and uncoated portions, the coated portions being disposed above boundaries between the color filters; and

f) forming dome-typed microlenses on a patterned OCL.

9. The method as recited in claim 8, the step f) includes the steps of:

f1) forming a microlens layer on the patterned OCL;

f2) forming rectangular microlenses by patterning the microlens layer into a predetermined configuration; and

f3) carrying out a flow process.

10. The method as recited in claim 9, wherein the microlens layer uses a silicon oxide-based photoresist material.

11. The method as recited in claim 8, wherein the coated portion of the binary mask has the width less than a maximum resolution in order to form the opening with the width in the range of about 0.1 μm to about 0.2 μm.

12. The method as recited in claim 8, wherein the width and the height of the opening is adjusted by controlling a dose amount.

13. The method as recited in claim 8, wherein the coated portions of the binary mask are coated with Cr.

14. The method as recited in claim 8, after the step d), further comprising the step of carrying out a curing process for hardening the OCL.

15. A method for manufacturing a CMOS image sensor having microlenses therein, the method comprising the steps of:

a) preparing a semiconductor substrate including isolation regions and photodiodes therein obtained by a predetermined process;

b) forming an ILD, metal interconnections and a passivation layer formed on the semiconductor substrate in sequence;

c) forming a color filter array having a plurality of color filters on the passivation layer;

d) forming an OCL on the color filter array by using a negative photoresist;

e) forming openings in the OCL by patterning the OCL by using a phase shifted mask (PSM), wherein the PSM has a 0°

phase and a 180° phase, boundaries between the 0° phase and the 180° phase being disposed above boundaries between the color filters; and

f) forming dome-typed microlenses on a patterned OCL.

16. The method as recited in claim 15, the step f) includes the steps of:

f1) forming a microlens layer on the patterned OCL;

f2) forming rectangular microlenses by patterning the microlens layer into a predetermined configuration; and

f3) carrying out a flow process.

17. The method as recited in claim 16, wherein the microlens layer uses a silicon oxide-based photoresist material.

18. The method as recited in claim 15, wherein each opening has the width ranging from about 0.03 μm to about 0.1 μm.

19. The method as recited in claim 15, wherein the width and the height of the opening is adjusted by controlling a dose amount.

20. The method as recited in claim 15, after the step d), further comprising the step of carrying out a curing process for hardening the OCL.

21. A method for manufacturing a CMOS image sensor having microlenses therein, the method comprising the steps of:

a) preparing a semiconductor substrate including isolation regions and photodiodes therein obtained by a predetermined process;

b) forming an ILD, metal interconnections and a passivation layer formed on the semiconductor substrate in sequence;

c) forming a first OCL, a color filter array, a second OCL and a third OCL on the passivation layer sequentially;

d) patterning the third OCL into a preset configuration, thereby forming openings and a patterned third OCL; and

e) forming dome-typed microlenses on a patterned third OCL.

22. The method as recited in claim 21, wherein the first OCL is formed with the thickness of about 6,500 Å.

23. The method as recited in claim 21, wherein the second OCL is formed with the thickness of about 5,000 Å.

24. The method as recited in claim 21, wherein the third OCL is formed with the thickness in the range of about 1,400 Å to about 1,600 Å.

25. The method as recited in claim 21, the step f) includes the steps of:

f1) forming a microlens layer on the patterned third OCL;

f2) forming rectangular microlenses by patterning the microlens layer into a predetermined configuration; and

f3) carrying out a flow process.

26. The method as recited in claim 25, wherein the microlens layer is formed with the thickness in the range of about 5,500 Å to about 7,500 Å.

27. The method as recited in claim 25, wherein the microlens layer uses a silicon oxide-based photoresist material.

28. The method as recited in claim 21, wherein the width and the height of the opening is adjusted by controlling a dose amount.

29. The method as recited in claim 21, wherein the step g) includes the steps of:

g1) carrying out a blank bleaching process;

g2) carrying out a flow process for about 5 minutes at about 150 ℃; and

g3) carrying out a curing process for about 5 minutes at

about 200 ℃ in order to harden the dome-typed microlenses.

30. The method as recited in claim 29, wherein the step g2) is carried out for about 5 minutes at about 150 ℃.

31. The method as recited in claim 29, wherein the step g3) is carried out for about 5 minutes at about 200 ℃.

32. The method as recited in claim 21, wherein the pattered third OCL has an octagonal shape.